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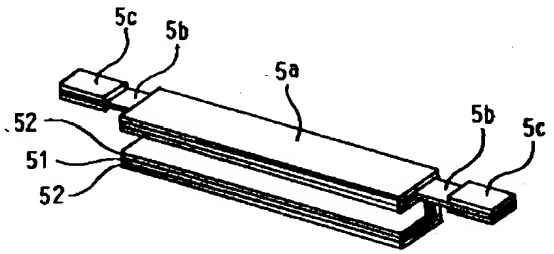
最終頁に続く

(54)【発明の名称】　平面型蛍光灯

(57)【要約】
【課題】　前面基板と背面箱体とがフリットガラスを介して接合されることにより放電室が構成され、前記放電室内には放電ガスが封入されると共に一対の放電電極が配置され、前記放電室内の上下面には蛍光体が塗布され、前記放電電極の端部は前記接合材を貫通して前記放電室外に引き出された平面型蛍光灯において、放電電極の構成を改良することにより、高性能、長寿命、低コストの平面型蛍光灯を提供する。
【解決手段】　本発明による平面型蛍光灯における放電電極の放電室内に配される部分は、第１の金属材からなる薄板が第２の金属材からなる被覆層により挟まれた構成を有し、前記第１の金属材は、前記第２の金属材に比べてフリットガラスに近い熱膨張率を有し、前記第２の金属材は、前記第１の金属材に比べて２次電子を放出しやすいかスパッタ率が低い、或いは２次電子を放出しやすくてスパッタ率が低いことを特徴とする。



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【特許請求の範囲】

【請求項１】　前面基板と背面箱体とが接合材を介して接合されることにより放電室が構成され、該放電室内には放電ガスが封入されると共に一対の放電電極が配置され、前記放電室内の上下面には蛍光体が塗布され、前記放電電極の端部は前記接合材を貫通して前記放電室外に引き出された平面型蛍光灯において、

前記放電電極の前記放電室内に配される部分は、第１の金属材からなる薄板が第２の金属材からなる被覆層により挟まれた構成を有し、

前記第１の金属材は、前記第２の金属材に比べて前記接合材に近い熱膨張率を有し、

前記第２の金属材は、前記第１の金属材に比べて２次電子を放出しやすいかスパッタ率が低い、或いは２次電子を放出しやすくてスパッタ率が低いことを特徴とする平面型蛍光灯。

【請求項２】　前記放電電極の前記接合材を貫通する部分は、前記第２の金属材からなる被覆層が形成されずに前記第１の金属材からなる薄板が露出し、該露出部に酸化皮膜が形成されていることを特徴とする請求項１記載の平面型蛍光灯。

【請求項３】　前記第１の金属材からなる薄板と前記第２の金属材からなる被覆層との間に、両金属材に含まれる原子の拡散を防止するための中間層を設けたことを特徴とする請求項１記載の平面型蛍光灯。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は、液晶表示装置のバックライト等に用いられる平面型蛍光灯に関する。

【０００２】

【従来の技術】液晶表示装置のバックライト等に用いられる平面型蛍光灯の構成例を図３（斜視図）及び図４（図３のＡ－Ａ断面図）に示す。この平面型蛍光灯は、透明なガラス材からなる前面基板１と透明又は不透明なガラス材又はセラミック材からなる背面箱体２とが接合材としてのフリットガラス３を介して接合されることにより放電室４が構成され、該放電室内にはＮｅ、Ａｒ、Ｘｅ、Ｈｇ等を含む放電ガス（図示せず）が約５ｋＰａの圧力で封入されると共に一対の放電電極５が配置され、前記放電室内の上下面には蛍光体６が塗布され、前記放電電極の端部が前記接合材としてのフリットガラスを貫通して前記放電室外に引き出されたものである。

【０００３】ここで、従来技術による放電電極５は、図５に示すように、前記放電室内に配される主部材５０１と前記フリットガラスを貫通するリード部材５０２とがスポット溶接５０３されたものである。

【０００４】前記放電電極のリード部材は、フリットガラスに近い熱膨張率を有すると共にフリットガラスとの接合性を向上させるための酸化皮膜を形成しやすい材料（例えば４２％Ｎｉ－６％Ｃｒ－残Ｆｅ合金）により構成される。尚、該リード部材の前記放電室外に引き出された端部には、外部回路と接続するためのハンダが被着される。

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【０００５】一方、前記放電電極の主部材は、２次電子を放出しやすくて前記リード部材とスポット溶接しやすい材料（例えばＮｉ）により構成される。

【０００６】

【発明が解決しようとする課題】ところが、上記従来技術による放電電極の構成では、放電電極の主部材とリード部材とをスポット溶接しているため、接続が不安定で点灯中に断線が生じることがある。又、スポット溶接時に金属が飛散して主部材に付着すると、放電が不均一になる。又、スポット溶接部は突起形状となるため、局部放電や異常放電の原因となりやすい。

【０００７】一方、放電電極の主部材として多用されるＮｉの熱膨張率は、前面基板や背面箱体の材料として多用されるガラスの熱膨張率と大きく異なるため、放電電極のリード部材とフリットガラスとの接合部に熱応力がかかり、該接合部或いは前面基板、背面箱体に破損が生じることがある。

【０００８】更に、放電電極のリード部材の放電室外に引き出された端部にハンダを被着するためには、該リード部材とフリットガラスとの接合性を向上させるために形成した酸化皮膜を除去する必要があり、工数増によるコストアップの一因となる。

【０００９】本発明は、従来技術における上述の如き問題点解決するものである。

【００１０】

【課題を解決するための手段】本発明による平面型蛍光灯は、前面基板と背面箱体とが接合材を介して接合されることにより放電室が構成され、前記放電室内には放電ガスが封入されると共に一対の放電電極が配置され、前記放電室内の上下面には蛍光体が塗布され、前記放電電極の端部は前記接合材を貫通して前記放電室外に引き出された平面型蛍光灯において、前記放電電極の前記放電室内に配される部分は、第１の金属材からなる薄板が第２の金属材からなる被覆層により挟まれた構成を有し、前記第１の金属材は、前記第２の金属材に比べて前記接合材に近い熱膨張率を有し、前記第２の金属材は、前記第１の金属材に比べて２次電子を放出しやすいかスパッタ率が低い、或いは２次電子を放出しやすくてスパッタ率が低いことを特徴とする。

【００１１】更に好ましくは、前記放電電極の前記接合材を貫通する部分は、前記第２の金属材からなる被覆層が形成されずに前記第１の金属材からなる薄板が露出し、該露出部に酸化皮膜が形成されていることを特徴とする。

【００１２】

【発明の実施の形態】本発明実施例による平面型蛍光灯は、前記図３及び図４に示したものと同様な全体構成を

有し、放電電極の細部構成に特徴を有するものである。

【００１３】本発明実施例による平面型蛍光灯における放電電極の細部構成を図１に示す。該放電電極の前記放電室内に配される部分５ａは、第１の金属材からなる厚さ約２００μｍの薄板５１が第２の金属材からなる厚さ約５μｍ～約５０μｍの被覆層５２により挟まれた構成を有し、該放電電極の前記接合材を貫通する部分５ｂは、前記第２の金属材からなる被覆層が形成されずに前記第１の金属材からなる薄板が露出し、該露出部に酸化皮膜が形成されている。更に、該放電電極の前記放電室外に引き出される端部５ｃは、前記放電室内に配される部分と同様に第１の金属材からなる薄板が第２の金属材からなる被覆層により挟まれた構成を有し、前記第２の金属材からなる被覆層を覆って、外部回路と接続するためのハンダ（図示せず）が被着される。

【００１４】前記第１の金属材としては、４２％Ｎｉ－６％Ｃｒ－残Ｆｅ合金等が用いられ、前記第２の金属材としては、Ｎｉ等が用いられる。第１の金属材としての４２％Ｎｉ－６％Ｃｒ－残Ｆｅ合金は、第２の金属材としてのＮｉに比べてフリットガラスに近い熱膨張率を有し、且つ酸化皮膜が形成されやすい。一方、第２の金属材としてのＮｉは、第１の金属材としての４２％Ｎｉ－６％Ｃｒ－残Ｆｅ合金に比べて２次電子を放出しやすく、且つスパッタ率が低い。

【００１５】放電電極の放電室内に配される部分の表面が２次電子を放出しやすい金属に覆われていれば、放電の始動電圧及び維持電圧を下げることができ、平面型蛍光灯としての点灯性が向上すると共に消費電力が低減する。又、放電電極の放電室内に配される部分の表面がスパッタ率の低い金属に覆われていれば、長時間の放電に伴う電極の消耗やスパッタ粒子の再付着によるによる蛍光面の汚染が少なく、平面型蛍光灯としての実用寿命が長くなる。

【００１６】第１の金属材と第２の金属材との複合体は、図２に示すように、第１の金属材からなる薄板５１０の両面で酸化皮膜を形成すべき箇所を除く部分に、第２の金属材からなる箔５２０を冷間圧接することにより形成される。その後、前記複合体を放電電極となるべき形状にプレスで打ち抜くかエッチングし、約１０００℃の露点下水素炉中で処理することにより、第１の金属材が露出した部分のみに酸化皮膜が形成される。

【００１７】第２の金属材としては、前記Ｎｉの他、Ｎｉ－Ｆｅ合金、Ｎｉ－Ｃｒ－Ｆｅ合金、Ａｌ、Ｃｕ、Ｚｎ等を用いてもよい。Ａｌ、Ｃｕ、Ｚｎ等は、前記Ｎｉに比べて２次電子を放出しやすく、スパッタ率も低い。Ａｌ、Ｃｕ、Ｚｎ等は、従来、放電電極のリード部材としての４２％Ｎｉ－６％Ｃｒ－残Ｆｅ合金とのスポット溶接が困難なために、放電室内に配される主部材として使用することができなかったものである。

【００１８】但し、第２の金属材としてＡｌ、Ｃｕ、Ｚｎ等を用いる場合、第１の金属材との複合体に酸化処理を施す際に、第１の金属材としてのＮｉ－Ｃｒ－Ｆｅ合金中に含まれるＣｒが第２の金属材中に拡散し、第２の金属材の導電性や２次電子放出性が低下するという問題が起こりやすい。この場合、酸化処理を行う温度を下げるか、Ｎｉ－Ｃｒ－Ｆｅ合金薄板とＡｌ箔、Ｃｕ箔、Ｚｎ箔等との間に、Ｎｉ－Ｆｅ合金等からなる拡散防止層を介在させて冷間圧接すればよい。

【００１９】一方、前記放電室を構成する前面基板の材料としてシリカを多く含む硬質ガラス、背面箱体の材料としてアルミナを多く含むセラミック材を採用する場合には、放電電極を構成する第１の金属材として、前記４２％Ｎｉ－６％Ｃｒ－残Ｆｅ合金に比べて熱膨張率が小さい２９％Ｎｉ－１６％Ｃｏ－残Ｆｅ合金、４２％Ｎｉ－残Ｆｅ合金等が適する。この場合、第１の金属材の酸化処理温度を低くすることができるため、第２の金属材としてＡｌ、Ｃｕ、Ｚｎ等を用いる場合の利点を生かすのに好都合である。

【００２０】

【発明の効果】本発明によれば、平面型蛍光灯の放電電極を第１の金属材からなる薄板が第２の金属材からなる被覆層により挟まれた構成とするので、従来の放電電極のように放電室内に配される主部材と放電室外に引き出されるリード部材とをスポット溶接する必要がなく、製造工程が簡略化されると共に放電電極の破断、汚れ等が生じにくく、局部放電、異常放電等も起こりにくい。

【００２１】又、前記第１の金属材からなる薄板は、フリットガラスを貫通する部分が従来の放電電極におけるリード部材と同様にフリットガラスとの接合性、熱膨張率の整合性等の作用効果を奏するのに加え、放電電極の放電室内に配される部分の芯材として、前面基板及び背面箱体との熱膨張率の整合性にも寄与し、放電電極とフリットガラスとの接合部、或いは前面基板、背面箱体の破損を抑制する。

【００２２】一方、前記第２の金属材からなる被覆層は、従来の放電電極における主部材に代わる作用効果を奏するものであるが、従来の放電電極における主部材のようにリード部材とのスポット溶接性に制約されることなく、２次電子放出が大きくてスパッタ率が低い材料を選択して採用することができるので、平面型蛍光灯としての点灯性の向上、消費電力の低減、実用寿命の延長等に寄与する。

【００２３】以上のように、本発明によれば高性能、長寿命、低コストの平面型蛍光灯が提供される。

【図面の簡単な説明】

【図１】本発明実施例による平面型蛍光灯における放電電極の斜視図である。

【図２】本発明実施例において用いらる放電電極の複合体の斜視図である。

【図３】平面型蛍光灯の全体構成を示す斜視図である。

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【図４】平面型蛍光灯の全体構成を示す断面図である。
【図５】従来例による平面型蛍光灯における放電電極の斜視図である。
【符号の説明】
1　前面基板
2　背面箱体

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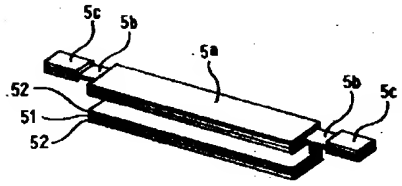
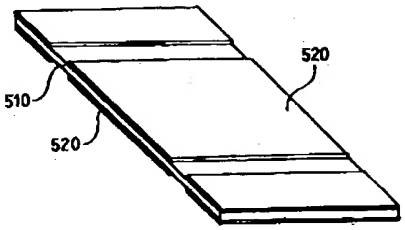
3　接合材（フリットガラス）
4　放電室
5　放電電極
５１　第１の金属材からなる薄板
５２　第２の金属材からなる被覆層
6　蛍光体

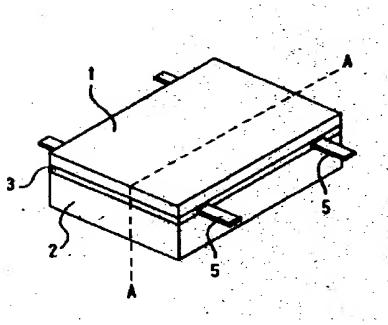
【図１】



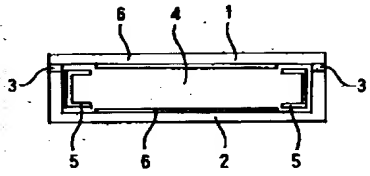
【図２】



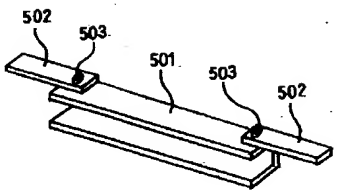
【図３】



【図４】



【図５】



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SANYO DENSHI BUHIN KK
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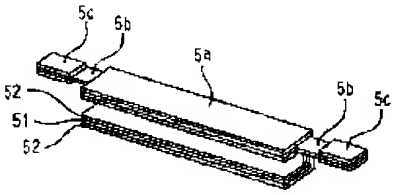
(54) FLAT FLUORESCENT LAMP

(57)Abstract:
PROBLEM TO BE SOLVED: To realize high performance, long service life and low cost by constituting a discharge electrode by nipping a thin plate formed from a first metal material by covering layers formed from a second metal material when a discharge chamber is composed by bonding a front board to a rear box body via frit glass, a discharge gas is enclosed and a pair of discharge electrodes are arranged in the discharge chamber, a phosphor is applied to the upper and lower surfaces in the discharge chamber, ends of the discharge electrodes are extracted outside the discharge chamber which passes through the bonding material.
SOLUTION: A part arranged in a discharge chamber of discharge electrodes in this fluorescent lamp has a structure where a thin plate 51 formed from a first metal material is nipped by covering layers 52 formed from a second metal material. In this case, the first metal material has a thermal expansion rate closer to a frit glass than the second metal material, and the second metal material is easy to emit secondary electrons, or has a low sputtering rate, or is easy to emit secondary electrons and has a low sputtering rate as compared with the first metal material.



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[Date of final disposal for application]

[Patent number]

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CLAIMS

[Claim(s)]
[Claim 1] An electric discharge room is constituted by joining a front substrate and a tooth-back box through jointing material. In the flat-surface type fluorescent lamp which the discharge electrode of a couple has been arranged while the discharge gas was enclosed with this electric discharge interior of a room, the fluorescent substance was applied to the vertical side of the aforementioned electric discharge interior of a room, and the edge of the aforementioned discharge electrode penetrated the aforementioned jointing material, and was pulled out by the aforementioned electric discharge outdoor The portion allotted to the aforementioned electric discharge interior of a room of the aforementioned discharge electrode It has the composition sandwiched by the enveloping layer which the sheet metal which consists of the 1st metal material becomes from the 2nd metal material. the metal material of the above 1st It is the flat-surface type fluorescent lamp which has the coefficient of thermal expansion near the aforementioned jointing material compared with the metal material of the above 2nd, the metal material of the above 2nd tends to emit a secondary electron compared with the metal material of the above 1st, or is easy to emit a secondary electron and is characterized by a sputtering yield being low or a sputtering yield is low.
[Claim 2] The portion which penetrates the aforementioned jointing material of the aforementioned discharge electrode is a flat-surface type fluorescent lamp according to claim 1 characterized by the sheet metal which consists of metal material of the above 1st, without forming the enveloping layer which consists of metal material of the above 2nd being exposed, and forming the oxide film in this outcrop.
[Claim 3] The flat-surface type fluorescent lamp according to claim 1 characterized by preparing the interlayer for preventing diffusion of the atom contained in both metal material between the enveloping layers which consist of metal material of the sheet metal which consists of metal material of the above 1st, and the above 2nd.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[The technical field to which invention belongs] this invention relates to the flat-surface type fluorescent lamp used for the back light of a liquid crystal display etc.
[0002]
[Description of the Prior Art] The example of composition of the flat-surface type fluorescent lamp used for the back light of a liquid crystal display etc. is shown in drawing 3 (perspective diagram) and drawing 4 (A-A cross section of drawing 3). The electric discharge room 4 is constituted by joining the tooth-back box 2 which consists of the front substrate 1 which this flat-surface type fluorescent lamp becomes from transparent glass material, transparent or opaque glass material, or ceramic material through the frit glass 3 as jointing material. While the discharge gas (not shown) containing Ne, Ar, Xe, Hg, etc. is enclosed with this electric discharge interior of a room by the pressure of about 5 kPa(s), the discharge electrode 5 of a couple is arranged. A fluorescent substance 6 is applied to the vertical side of the aforementioned electric discharge interior of a room, and the edge of the aforementioned discharge electrode penetrates the frit glass as the aforementioned jointing material, and is pulled out by the aforementioned electric discharge outdoor.
[0003] the lead which penetrates the principal piece material 501 allotted to the aforementioned electric discharge interior of a room and the aforementioned frit glass here as the discharge electrode 5 by the conventional technology is shown in drawing 5 -- a member 502 is carried out spot welding 503
[0004] The lead member of the aforementioned discharge electrode is constituted by the material (for example, 42%nickel-6%Cr-** Fe alloy) which is easy to form the oxide film for raising junction nature with frit glass while it has the coefficient of thermal expansion near frit glass. in addition, this lead -- the pewter for connecting with an external circuit is put on the edge pulled out by the aforementioned electric discharge outdoor of a member
[0005] On the other hand, the principal piece material of the aforementioned discharge electrode tends to emit a secondary electron, and is constituted by the aforementioned lead member and spot welding plain-gauze cone material (for example, nickel).
[0006]
[Problem(s) to be Solved by the Invention] However, with the composition of the discharge electrode by the above-mentioned conventional technology, since spot welding of the principal piece material and lead member of a discharge electrode is carried out, connection may be unstable and an open circuit may arise during lighting. Moreover, electric discharge will become uneven, if a metal disperses at the time of spot welding and it adheres to principal piece material. Moreover, since the spot welding section serves as a salient configuration, it tends to cause local electric discharge and unusual electric discharge.
[0007] On the other hand, since the coefficient of thermal expansion of nickel used abundantly as principal piece material of a discharge electrode differs from the coefficient of thermal expansion of the glass used abundantly as a material of a front substrate or a tooth-back box greatly, it may require thermal stress for the joint of the lead member of a discharge electrode, and frit glass, and breakage may produce it in this joint or a front substrate, and a tooth-back box.
[0008] furthermore, the lead of a discharge electrode -- in order to put a pewter on the edge pulled out by the electric discharge outdoor of a member, it is necessary to remove the oxide film formed in order to raise the junction nature of this lead member and frit glass, and becomes the cause of the cost rise by the increase of a man day
[0009] this invention is a thing like **** in the conventional technology which carries out trouble solution.
[0010]
[Means for Solving the Problem] As for the flat-surface type fluorescent lamp by this invention, an electric discharge room is constituted by joining a front substrate and a tooth-back box through jointing material. In the flat-surface type fluorescent lamp which the discharge electrode of a couple has been arranged while the discharge gas was enclosed with the aforementioned electric discharge interior of a room, the fluorescent substance was applied to the vertical side of the aforementioned electric discharge interior of a room, and the edge of the aforementioned discharge electrode penetrated the aforementioned jointing material, and was pulled out by the aforementioned electric discharge outdoor The portion allotted to the aforementioned electric discharge interior of a room of the aforementioned discharge electrode It has the composition sandwiched by the enveloping layer which the sheet metal which consists of the 1st metal material becomes from the 2nd metal material. the metal material of the above 1st Compared with the metal material of the above 2nd, it has the coefficient of thermal expansion near the aforementioned jointing material, and compared with the metal material of the above 1st, it is easy

to emit a secondary electron, or a sputtering yield tends to emit a low or a secondary electron, and the metal material of the above 2nd is characterized by a sputtering yield being low.
[0011] Furthermore, preferably, the sheet metal which consists of metal material of the above 1st, without forming the enveloping layer which consists of metal material of the above 2nd is exposed, and the portion which penetrates the aforementioned jointing material of the aforementioned discharge electrode is characterized by forming the oxide film in this outcrop.
[0012]
[Embodiments of the Invention] The flat-surface type fluorescent lamp by this invention example has the same whole composition as what was shown in aforementioned drawing 3 and drawing 4 , and has the feature in the details composition of a discharge electrode.
[0013] The details composition of the discharge electrode in the flat-surface type fluorescent lamp by this invention example is shown in drawing 1 . Partial 5a allotted to the aforementioned electric discharge interior of a room of this discharge electrode It has the composition sandwiched by the enveloping layer 52 with a thickness of about 5 micrometers - about 50 micrometers which sheet metal 51 with a thickness of about 200 micrometers it is thin from the 1st metal material becomes from the 2nd metal material. The sheet metal which consists of metal material of the above 1st, without forming the enveloping layer which consists of metal material of the above 2nd exposes partial 5b which penetrates the aforementioned jointing material of this discharge electrode, and the oxide film is formed in this outcrop. Furthermore, it has the composition sandwiched by the enveloping layer which the sheet metal which consists of the 1st metal material like the portion allotted to the aforementioned electric discharge interior of a room as for edge 5c pulled out by the aforementioned electric discharge outdoor of this discharge electrode becomes from the 2nd metal material, the enveloping layer which consists of metal material of the above 2nd is covered, and the pewter (not shown) for connecting with an external circuit is put.
[0014] As metal material of the above 1st, a 42%nickel-6%Cr-** Fe alloy etc. is used and nickel etc. is used as metal material of the above 2nd. The 42%nickel-6%Cr-** Fe alloy as 1st metal material has the coefficient of thermal expansion near frit glass compared with nickel as 2nd metal material, and an oxide film is easy to be formed. On the other hand, nickel as 2nd metal material tends to emit a secondary electron compared with the 42%nickel-6%Cr-** Fe alloy as 1st metal material, and a sputtering yield is a low.
[0015] If the metal which is easy to emit a secondary electron is covered with the front face of the portion allotted to the electric discharge interior of a room of a discharge electrode, while the starting voltage and the sustaining voltage of electric discharge can be lowered and the lighting nature as a flat-surface type fluorescent lamp will improve, power consumption decreases. Moreover, if the low metal of a sputtering yield is covered with the front face of the portion allotted to the electric discharge interior of a room of a discharge electrode, there will be little contamination of the phosphor screen depended for being based on the reattachment [exhausting / of an electrode] of a spatter particle accompanying prolonged electric discharge, and the working life as a flat-surface type fluorescent lamp will become long.
[0016] The complex of the 1st metal material and the 2nd metal material is formed by carrying out cold pressure welding of the foil 520 which becomes a portion except the part which should form an oxide film by both sides of the sheet metal 510 which consists of the 1st metal material from the 2nd metal material, as shown in drawing 2 . Then, an oxide film is formed only in the portion which the 1st metal material exposed whether the aforementioned complex is pierced with a press in the configuration which should serve as a discharge electrode, and by **********ing and processing all over the bottom hydrogen furnace of a dew-point of about 1000 degrees C.
[0017] As 2nd metal material, you may use a nickel-Fe alloy besides Above nickel, a nickel-Cr-Fe alloy, aluminum, Cu, Zn, etc. aluminum, Cu, Zn, etc. tend to emit a secondary electron compared with Above nickel, and a sputtering yield is also a low. Spot welding with the 42%nickel-6%Cr-** Fe alloy as a lead member of a discharge electrode cannot use aluminum, Cu, Zn, etc. conventionally as principal piece material allotted to eye a difficult hatchet in the electric discharge interior of a room.

[0018] However, when using aluminum, Cu, Zn, etc. as 2nd metal material, in case oxidation treatment is performed to complex with the 1st metal material, Cr contained in the nickel-Cr-Fe alloy as 1st metal material is spread in the 2nd metal material, and the problem that the conductivity of the 2nd metal material and secondary-electron-emission nature fall tends to arise. In this case, what is necessary is to make the diffusion prevention layer which lowers the temperature which performs oxidation treatment or consists of a nickel-Fe alloy etc. between nickel-Cr-Fe alloy sheet metal, aluminum foil, Cu foil, Zn foil, etc. intervene, and just to carry out cold pressure welding.
[0019] In adopting the hard glass which contains many silicas on the other hand as a material of the front substrate which constitutes the aforementioned electric discharge room, and the ceramic material which contains many aluminas as a material of a tooth-back box, compared with the aforementioned 42%nickel-6%Cr-** Fe alloy, a 29%nickel-16%Co-** Fe alloy with a small coefficient of thermal expansion, a 42%nickel-** Fe alloy, etc. are suitable as 1st metal material which constitutes a discharge electrode. In this case, since oxidation-treatment temperature of the 1st metal material can be made low, it is convenient to an energize's in the advantage in the case of using aluminum, Cu, Zn, etc. as 2nd metal material.
[0020]
[Effect of the Invention] Since the discharge electrode of a flat-surface type fluorescent lamp is considered as the composition sandwiched by the enveloping layer which the sheet metal which consists of the 1st metal material becomes from the 2nd metal material according to this invention, while not carrying out spot welding of the principal piece material allotted to the electric discharge interior of a room like the conventional discharge electrode, and the lead member pulled out by electric

discharge outdoor and simplifying a manufacturing process, it is hard to produce fracture of a discharge electrode, dirt, etc., and it is hard for local electric discharge, unusual electric discharge, etc. to happen.

[0021] The portion which penetrates frit glass the sheet metal which consists of metal material of the above 1st like the lead member in the conventional discharge electrode Moreover, junction nature with frit glass, In addition to doing so the operation effects, such as the adjustment of coefficient of thermal expansion, as a core material of the portion allotted to the electric discharge interior of a room of a discharge electrode, it contributes also to the adjustment of coefficient of thermal expansion with a front substrate and a tooth-back box, and breakage of the joint of a discharge electrode and frit glass or a front substrate, and a tooth-back box is suppressed.

[0022] on the other hand, although the enveloping layer which consists of metal material of the above 2nd does so the operation effect replaced with the principal piece material in the conventional discharge electrode, it is restrained like the principal piece material in the conventional discharge electrode by spot-welding nature with a lead member -- since secondary electron emission is large and a sputtering yield can choose and adopt low material without things, it contributes to improvement in the lighting nature as a flat-surface type fluorescent lamp, reduction of power consumption, extension of a working life, etc.

[0023] As mentioned above, according to this invention, high performance, long lasting, and the flat-surface type fluorescent lamp of a low cost are offered.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] However, with the composition of the discharge electrode by the above-mentioned conventional technology, since spot welding of the stating part material and lead member of a discharge electrode is carried out, connection may be unstable and an open circuit may arise during lighting. Moreover, electric discharge will become uneven, if a metal disperses at the time of spot welding and it adheres to stating part material. Moreover, since the spot welding section serves as a salient configuration, it tends to cause local electric discharge and unusual electric discharge.
[0007] On the other hand, since the coefficient of thermal expansion of nickel used abundantly as stating part material of a discharge electrode differs from the coefficient of thermal expansion of the glass used abundantly as a material of a front substrate or a tooth-back box greatly, it may require thermal stress for the joint of the lead member of a discharge electrode, and frit glass, and breakage may produce it in this joint or a front substrate, and a tooth-back box.
[0008] furthermore, the lead of a discharge electrode -- in order to put a pewter on the edge pulled out by the electric discharge outdoor of a member, it is necessary to remove the oxide film formed in order to raise the junction nature of this lead member and frit glass, and becomes the cause of the cost rise by the increase of a man day
[0009] this invention is a thing like **** in the conventional technology which carries out trouble solution.

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MEANS

[Means for Solving the Problem] As for the flat-surface type fluorescent lamp by this invention, an electric discharge room is constituted by joining a front substrate and a tooth-back box through jointing material. In the flat-surface type fluorescent lamp which the discharge electrode of a couple has been arranged while the discharge gas was enclosed with the aforementioned electric discharge interior of a room, the fluorescent substance was applied to the vertical side of the aforementioned electric discharge interior of a room, and the edge of the aforementioned discharge electrode penetrated the aforementioned jointing material, and was pulled out by the aforementioned electric discharge outdoor The portion allotted to the aforementioned electric discharge interior of a room of the aforementioned discharge electrode It has the composition sandwiched by the enveloping layer which the sheet metal which consists of the 1st metal material becomes from the 2nd metal material. the metal material of the above 1st Compared with the metal material of the above 2nd, it has the coefficient of thermal expansion near the aforementioned jointing material, and compared with the metal material of the above 1st, it is easy to emit a secondary electron, or a sputtering yield tends to emit a low or a secondary electron, and the metal material of the above 2nd is characterized by a sputtering yield being low.

[0011] Furthermore, preferably, the sheet metal which consists of metal material of the above 1st, without forming the enveloping layer which consists of metal material of the above 2nd is exposed, and the portion which penetrates the aforementioned jointing material of the aforementioned discharge electrode is characterized by forming the oxide film in this outcrop.

[0012]

[Embodiments of the Invention] The flat-surface type fluorescent lamp by this invention example has the same whole composition as what was shown in aforementioned drawing 3 and drawing 4 , and has the feature in the details composition of a discharge electrode.

[0013] The details composition of the discharge electrode in the flat-surface type fluorescent lamp by this invention example is shown in drawing 1 . Partial 5a allotted to the aforementioned electric discharge interior of a room of this discharge electrode It has the composition sandwiched by the enveloping layer 52 with a thickness of about 5 micrometers - about 50 micrometers which sheet metal 51 with a thickness of about 200 micrometers it is thin from the 1st metal material becomes from the 2nd metal material. The sheet metal which consists of metal material of the above 1st, without forming the enveloping layer which consists of metal material of the above 2nd exposes partial 5b which penetrates the aforementioned jointing material of this discharge electrode, and the oxide film is formed in this outcrop. Furthermore, it has the composition sandwiched by the enveloping layer which the sheet metal which consists of the 1st metal material like the portion allotted to the aforementioned electric discharge interior of a room as for edge 5c pulled out by the aforementioned electric discharge outdoor of this discharge electrode becomes from the 2nd metal material, the enveloping layer which consists of metal material of the above 2nd is covered, and the pewter (not shown) for connecting with an external circuit is put.

[0014] As metal material of the above 1st, a 42%nickel-6%Cr-** Fe alloy etc. is used and nickel etc. is used as metal material of the above 2nd. The 42%nickel-6%Cr-** Fe alloy as 1st metal material has the coefficient of thermal expansion near frit glass compared with nickel as 2nd metal material, and an oxide film is easy to be formed. On the other hand, nickel as 2nd metal material tends to emit a secondary electron compared with the 42%nickel-6%Cr-** Fe alloy as 1st metal material, and a sputtering yield is a low.

[0015] If the metal which is easy to emit a secondary electron is covered with the front face of the portion allotted to the electric discharge interior of a room of a discharge electrode, while the starting voltage and the sustaining voltage of electric discharge can be lowered and the lighting nature as a flat-surface type fluorescent lamp will improve, power consumption decreases. Moreover, if the low metal of a sputtering yield is covered with the front face of the portion allotted to the electric discharge interior of a room of a discharge electrode, there will be little contamination of the phosphor screen depended for being based on the reattachment [exhausting / of an electrode] of a spatter particle accompanying prolonged electric discharge, and the working life as a flat-surface type fluorescent lamp will become long.

[0016] The complex of the 1st metal material and the 2nd metal material is formed by carrying out cold pressure welding of the foil 520 which becomes a portion except the part which should form an oxide film by both sides of the sheet metal 510 which consists of the 1st metal material from the 2nd metal material, as shown in drawing 2 . Then, an oxide film is formed only in the portion which the 1st metal material exposed whether the aforementioned complex is pierced with a press in the configuration which should serve as a discharge electrode, and by **********ing and processing all over the bottom hydrogen furnace of a dew-point of about 1000 degrees C.

[0017] As 2nd metal material, you may use a nickel-Fe alloy besides Above nickel, a nickel-Cr-Fe alloy, aluminum, Cu, Zn, etc. aluminum, Cu, Zn, etc. tend to emit a secondary electron compared with Above nickel, and a sputtering yield is also a low. Spot welding with the 42%nickel-6%Cr-** Fe alloy as a lead member of a discharge electrode cannot use aluminum, Cu, Zn, etc. conventionally as principal piece material allotted to eye a difficult hatchet in the electric discharge interior of a room.

[0018] However, when using aluminum, Cu, Zn, etc. as 2nd metal material, in case oxidation treatment is performed to complex with the 1st metal material, Cr contained in the nickel-Cr-Fe alloy as 1st metal material is spread in the 2nd metal material, and the problem that the conductivity of the 2nd metal material and secondary-electron-emission nature fall tends to arise. In this case, what is necessary is to make the diffusion prevention layer which lowers the temperature which performs oxidation treatment or consists of a nickel-Fe alloy etc. between nickel-Cr-Fe alloy sheet metal, aluminum foil, Cu foil, Zn foil, etc. intervene, and just to carry out cold pressure welding.
[0019] In adopting the hard glass which contains many silicas on the other hand as a material of the front substrate which constitutes the aforementioned electric discharge room, and the ceramic material which contains many aluminas as a material of a tooth-back box, compared with the aforementioned 42%nickel-6%Cr-** Fe alloy, a 29%nickel-16%Co-** Fe alloy with a small coefficient of thermal expansion, a 42%nickel-** Fe alloy, etc are suitable as 1st metal material which constitutes a discharge electrode. In this case, since oxidation-treatment temperature of the 1st metal material can be made low, it is convenient to an energize's in the advantage in the case of using aluminum, Cu, Zn, etc. as 2nd metal material.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the perspective diagram of the discharge electrode in the flat-surface type fluorescent lamp by this invention example.
[Drawing 2] It uses in this invention example and is the perspective diagram of the complex of a **** discharge electrode.
[Drawing 3] It is the perspective diagram showing the whole flat-surface type fluorescent lamp composition.
[Drawing 4] It is the cross section showing the whole flat-surface type fluorescent lamp composition.
[Drawing 5] It is the perspective diagram of the discharge electrode in the flat-surface type fluorescent lamp by the conventional example.
[Description of Notations]
1 Front Substrate
2 Tooth-Back Box
3 Jointing Material (Frit Glass)
4 Electric Discharge Room
5 Discharge Electrode
51 Sheet Metal Which Consists of the 1st Metal Material
52 Enveloping Layer Which Consists of the 2nd Metal Material
6 Fluorescent Substance

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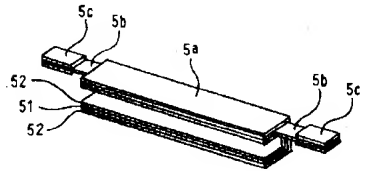
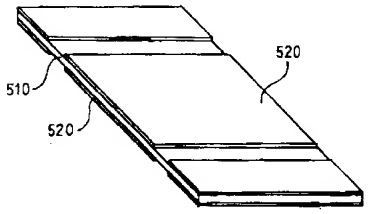
DRAWINGS

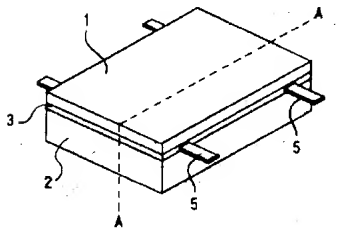
[Drawing 1]



[Drawing 2]

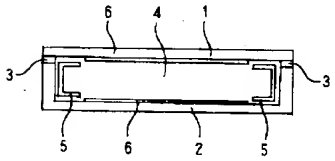


[Drawing 3]



Prior Art

[Drawing 4]



[Drawing 5]